

POWER SUPPLY FOR BATTERY-POWERED DEVICES**Background of the Invention**

The present invention is directed to the field of power supplies, particularly those
5 of the type used in devices that accept disposable batteries. In a retail establishment, it is
common to have displays that include battery-powered product items. It is widely
appreciated in retail business that the effectiveness of the display is greatly enhanced by
including a working demonstration model of the product item. However, in the case of a
battery-powered product, the batteries are quickly depleted if the product runs
10 continuously for a period of time. As a result, the batteries must be changed frequently,
resulting in considerable time and effort on the part of retail personnel, and also expense
in consumption of replacement batteries.

Another problem with battery-powered demonstration models is variable power
output. Even though a battery may power on item for a period of time, the battery
15 quickly loses voltage, causing the item to "slow down" in its performance. Such
performance would be undesirable in that it the item would not adequately demonstrate
the product. In order to solve this problem, the batteries would need to be changed even
more frequently, resulting in additional time, effort and battery expense.

20 **Summary of the Invention**

The difficulties and drawbacks of previous approaches are overcome by the
power supply of the present invention which includes a transformer/rectifier unit for
converting AC voltage to a suitable DC voltage. An end effector is provided and is

electrically connected to the transformer/rectifier unit for receiving DC voltage. The end effector is received in a battery receptacle of a battery-powered item, to supply electrical power thereto.

As will be realized, the invention is capable of other and different embodiments and its several details are capable of modifications in various respects, all without departing from the invention. Accordingly, the drawings and description are to be regarded as illustrative and not restrictive.

Brief Description of the Drawings

Fig. 1 shows a transformer unit connected to a plurality of end effecters, in accordance with the present invention.

Figs. 2A, 2B and 2C show various end effector arrangements received in a battery receptacle, in accordance with the present invention.

Fig. 3 shows a connection arrangement for connecting a plurality of end effector arrangements.

Detailed Description of the Invention

As shown in Fig. 1, a power supply transformer unit 10 is employed for converting AC voltage to a suitable DC voltage. In the preferred embodiment, the power supply 10 may include an electrical plug 12 for connecting to basic 110V AC electrical service. The power supply 10 includes a transformer and rectifier unit that converts the

AC voltage into DC voltage suitable for a battery-powered device, e.g. 1.5 V, 3.0 V, 9V, etc. The power supply 10 includes an output for receiving an electrical connector cable 14, which is in turn connected to an end effector 20.

The end effector 20 is preferably an electrical plug in general configuration of a standard removable battery, e.g. "AA," "AAA," "C," "D," "9V" or other such battery size configuration.. The end effector 20 is received in a battery receptacle 32 that is part of a battery-powered product item 30 to be demonstrated. The end effector 20 respectively includes positive and negative electrical terminals for engaging the electrical contacts within the receptacle 32. In this way, power is supplied from the transformer unit 10 directly to the product item 30, without the use of replaceable batteries.

A typical battery-powered device includes two or more batteries, received in the receptacle 32. In one embodiment, as shown in Fig. 2A, a respective number of end effectors 20 can be inserted to substitute for the required number of batteries. Alternatively, as shown in Fig. 2B, a single end effector 20 may be supplied for providing suitable voltage and one or more an additional "dummy batteries" 22 may be supplied so that a continuous connection can be made. Such a dummy battery 22 would be in the shape of an end effector, but not connected to a cable 14, and would be a simple conductor to establish a circuit, without providing additional voltage. Alternatively, as shown in Fig. 2C, a single end effector 20 could be provided and sized so as to fit into the space of multiple batteries. Other such variations could also be contemplated without departing from the invention.

As shown in Fig. 3, the present transformer unit 10 can include a plurality of outputs 40 for connecting a respective plurality of electrical cables 14. A large number of

outputs 40 can be provided to provide electrical service to a large number of product items 30. If a number of product items having the same voltage are used, the outputs can all be connected to a common power bus 42 for supplying constant voltage. Also, a number of buses 42 can be provided supplying different voltages to respective pluralities of product items 30. The outputs can include a removable receptacle 44 used with standardized voltage output terminal, such as RJ11, RJ45, RCA mini-plugs, or some other such type of connection. In this scheme, the cables 14 would have a standardized mating connector 46 for connecting to the receptacle 44 for easy connection and disconnection. To minimize electrical shock risk, a control for short-circuited current can be employed. As shown, each set of voltage output terminal 40 could have an in-line fuse 50 to open the circuit in the case of a short circuit event.

To maximize the life of the product item being demonstrated, a variety of schemes can be employed. Some items maximize product life by not being turned on and off. For these type of devices, the transformer unit 10 box would supply the DC voltage and current continuously. For those items that require a rest period, the transformer unit 10 could provide the DC voltage and current on a cycle of “X” seconds on followed by “Y” seconds off where the values of X and Y can be determined to best extend the life of the product. To maximize the demonstration capability while minimizing the “On” period, a sensor could be employed that turns the devices on only when people are determined to be present within a radius of the item where demonstration would be useful. The sensor can be selected from sensors that detect light, sound, motion or any physical parameter than might be detected. Also, it should be appreciated that an extender cable could be employed so that the DC supply could reach battery operated devices in a

remote location. It should also be understood that, in a location where a large number of battery-powered product items are present, any number of transformer units can be employed.

5 The present invention includes many benefits. With the present invention, the usage of batteries is greatly reduced, or even eliminated. Also, quite a bit of expense is saved since AC electrical service is much less expensive than the ongoing cost of disposable batteries. Further, the labor associated with repeatedly changing batteries is eliminated due to usage of the box and attendant cables. And also, the theft of batteries within the retail environment is reduced or eliminated in proportion to the reduction of
10 batteries required for insertion into products being demonstrated. With the present invention, the product demonstration environment is maintained at a desirable level throughout the day rather than the constant interruptions and down periods associated with having multiple product items having their batteries run out at the same time. In these ways and many others, the present invention offers great advantages over previous-
15 type implementations.

As described hereinabove, the present invention solves many problems associated with previous type systems. However, it will be appreciated that various changes in the details, materials and arrangements of parts which have been herein described and illustrated in order to explain the nature of the invention may be made by those skilled in
20 the area within the principle and scope of the invention will be expressed in the appended claims.